

FIRST RECORD OF THE GENUS *PAULIANACARUS* BALOGH FROM CHINA, WITH DESCRIPTION OF A NEW SPECIES (ACARI, ORIBATIDA, LOHMANNIIDAE)

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Abstract This paper describes a new species, *Paulianacarus* (*Paulianacarus*) *longyanensis* sp. nov. from China. The genus is newly recorded from China. The new species can be easily separated from the close known species by the body surface covered with remarkable network pattern, dorsal and ventral porose areas absent, and epimeral setal formula 7-2-3-4. Two new combinations, *Paulianacarus* (*Millotacarus*) *foliatus* Mondal et Chakrabarti, comb. nov. and *Paulianacarus* (*Millotacarus*) *sarbias* Coetzee, comb. nov. are provided. A key is also given to two subgenera and 12 known species of the genus.

Key words Lohmanniidae, *Paulianacarus*, new recorded genus, new species, China.

1 Introduction

The genus *Paulianacarus* was erected by Balogh (1960) with *Paulianacarus laevis* Balogh, 1960 as type species from Madagascar. In the same paper, Balogh (1960) instituted the genus *Millotacarus*, which was also collected from Madagascar, and he distinguished from *Paulianacarus* by the lack of dorsal porose areas, except for three pairs of round porose areas in transverse area five (Coetzee, 2001). Balogh and Balogh (1987) redefined the two genera and distinguished them by adding to the diagnosis of *Millotacarus* “notogastral setae phylliform, areae porosae absent”. More recently, Subias (2004, 2009) catalogued the Lohmanniidae and transferred *Millotacarus* Balogh, 1960 to *Paulianacarus* Balogh, 1960 as a subgenus, *Paulianacarus* (*Millotacarus*) Balogh, 1960.

During our study, we followed Subias (2004, 2009) by regarding *Millotacarus* as a subgenus of *Paulianacarus* and recognised 12 species of *Paulianacarus* including a new species and two new combinations. The specimens of the new species, *Paulianacarus* (*Paulianacarus*) *longyanensis* sp. nov. were collected from the surface soil layer under Bamboo, Longyan (23° 23' N, 116° 82' E), Fujian Province, China. This was the first record of the genus *Paulianacarus* Balogh, 1960 in China according to oribatid mites checklist by Chen *et al.* (2010). A key to 12 known species of the genus is also proposed.

2 Material and Methods

Measurements and descriptions are based on adults only. Specimens were mounted in lactic acid in

temporary cavity slides and studied with a light microscope equipped with a drawing attachment. Body length is measured from the tip of the rostrum to posterior edge of the notogaster; body width is measured at the widest part of the notogaster; length of setae is measured in the lateral aspect. The measurements were not made always with equal the same number of specimens because some structures were indiscernible in some specimens. The measurements are given in micrometers (μm), with the ranges for the paratypes in parentheses.

The morphological terminology used in the text is mostly that developed over many years by Grandjean (1950) and summarized by Balogh (1961). All specimens studied were fixed in Oudemans' fluid and deposited in the Institute of Entomology, Guizhou University (GUGC).

3 Taxonomy

Genus *Paulianacarus* Balogh, 1960

Diagnosis. Genital plates without transverse suture; anal and adanal plates fused; pre-anal plate as wide as genital opening; two pairs of anal setae, four pairs of adanal setae present, notogastral neotrichy absent (Balogh *et al.* Balogh, 1987; Coetzee, 2001).

Following the original descriptions, we found that the dorsal setae phylliform or setiform was the only steady character to differentiate between the two subgenera, *Paulianacarus* (*Millotacarus*) and *Paulianacarus* (*Paulianacarus*). However, looking at the original descriptions, the dorsal setae on the two species, *P.* (*P.*) *foliatus* Mondal et Chakrabarti, 1982 and *P.* (*P.*) *sarbias* Coetzee, 2001 are both phylliform,

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Received 16 Aug. 2011, accepted 6 Dec. 2011.

consequently, authors propose that *P. (P.) foliatus* and *P. (P.) sarbias* should be transferred to the subgenus *Paulianacarus* (*Millotacarus*), i. e., *P. (M.) foliatus* Mondal et Chakrabarti, comb. nov. and *P. (M.) sarbias* Coetzee, comb. nov.

Key to 12 known species of the genus *Paulianacarus* Balogh.

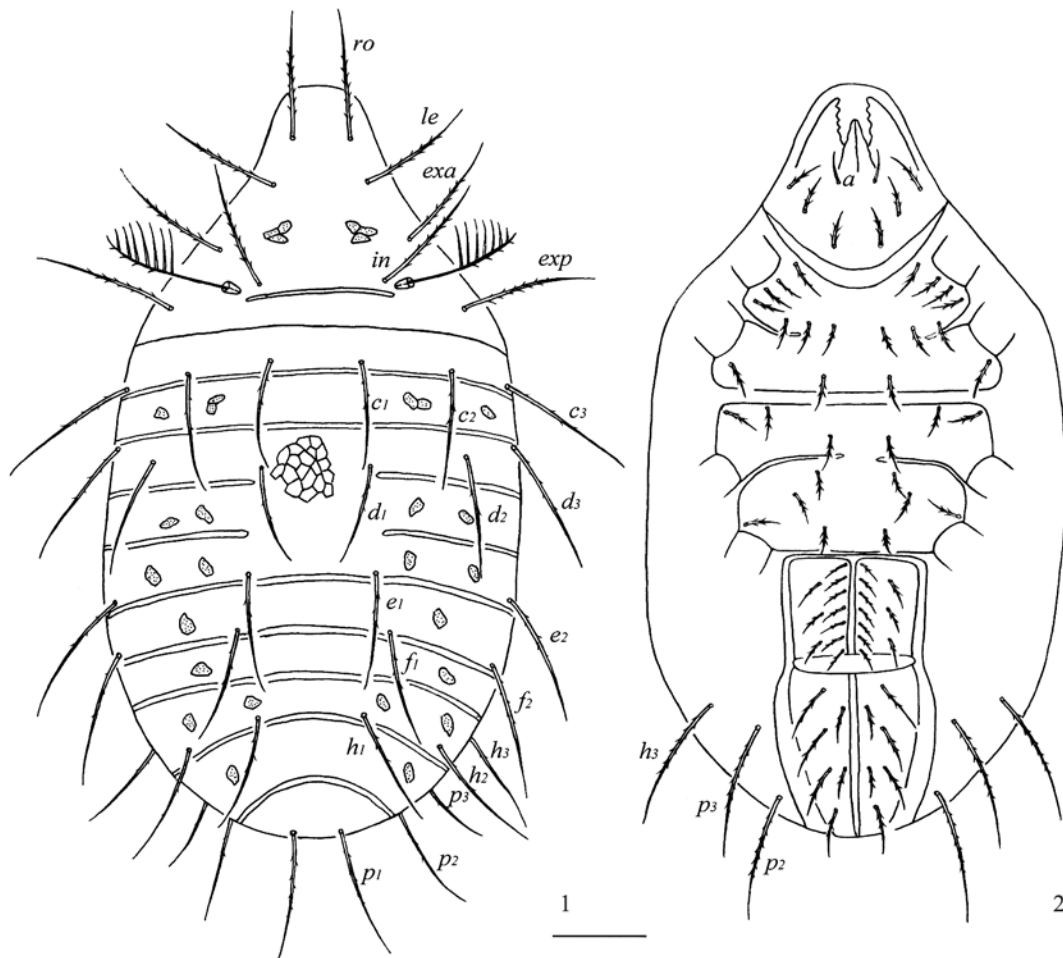
1. Notogastral setae phylliform 2
Notogastral setae setiform 5
2. Notogaster with four transverse bands, all ventral setae setiform *P. (M.) foliatus* Mondal et Chakrabarti, comb. nov.
Notogaster with more than four transverse bands, some ventral setae foliate 3
3. Notogaster with ten transverse bands *P. (M.) orientalis*
Notogaster with nine transverse bands 4
4. Transverse bands S_2 to S_4 complete, others interrupted
..... *P. (M.) sarbias* Coetzee, comb. nov.
Transverse bands S_2 , S_3 , S_6 , S_9 , S_{10} complete, others interrupted
..... *P. (M.) granulatus*
5. Nine pairs of setae on genital plates *P. (P.) rugulosus*
Ten pairs of setae on genital plates 6
6. Notogastral seta c_1 longer than distance $c_1 - d_1$ 7
Notogastral seta c_1 shorter than distance $c_1 - d_1$ 8
7. Notogaster with five transverse bands, dorsal and venter with porose areas; integument without remarkable network pattern, epimeral setal formula: 3-1-3-4 *P. (P.) simplisetosus*
Notogaster with nine transverse bands, dorsal and ventral porose areas absent; integument with remarkable network pattern; epimeral

setal formula: 7-2-3-4 *P. (P.) longyanensis* sp. nov.

8. Notogastral transverse bands represented by protruding incomplete crests *P. (P.) rugosus*
All or some notogastral transverse bands normal 9
9. Notogaster with large protruding tubercles and porose areas
..... *P. (P.) nodosus*
Notogaster without protruding tubercles 10
10. All notogastral transverse bands clear and complete, and with porose areas except 4th *P. (P.) laevis*
Some notogastral transverse bands interrupted and posterior bands obsolete, porose areas present in regions between c_1 and h_1 11
11. Entire body surface covered by equidistant punctate knobs; all transverse bands interrupted *P. (P.) barlowi*
Entire body surface covered by finely punctuations; transverse bands S_4 and S_5 complete, others interrupted
..... *P. (P.) grobleri*

***Paulianacarus* (*Paulianacarus*) *longyanensis* sp. nov. (Figs 1–2)**

Diagnosis. Body covered by remarkable network pattern, which also present on coxisternal region, genital and adanal plates. Some irregular rough patches present on the dorsal, dorsal and ventral porose areas absent. Notogastral setae setiform with tiny barbs; nine transverse bands present on notogaster. Epimeral I with neotrichy, epimeral setal formula: 7-2-3-4.



Figs 1–2. *Paulianacarus* (*Paulianacarus*) *longyanensis* sp. nov. 1. Dorsal view. 2. Ventral view. Scale bars = 100 μ m.

Integument. Color yellowish brown. Body and leg covered by remarkable network pattern. Irregular rough patches conspicuous in transverse areas. Dimensions. Length 842 (838 – 846), width 476 (473 – 477).

Prodorsum (Fig. 1). Rostrum blunt. Posterior exobothridial setae (*exp*) longer than other prodorsal setae. All prodorsal setae setiform and minutely barbed. Sensillus setiform, with seven long cilia and four short cilia on two sides separately. Transverse band situated behind interlamellar setae. Prodorsal setal lengths: $ro \approx exa \approx in \approx le = 149$ (146 – 151), $exp = 159$ (156 – 162).

Notogaster (Fig. 1). Lateral margins more or less parallel; Nine transverse bands ($s_2 - s_{10}$), s_4 and s_5 incomplete. 16 pairs of notogastral setae setiform, with minute barbs, seta c_1 longer than distance $c_1 - d_1$. Notogastral setae lengths: $c_1 \approx d_1 = 126$ (124 – 129), $c_2 \approx d_2 \approx e_1 \approx f_1 \approx h_1 = 146$ (143 – 148), $c_3 \approx d_3 \approx e_2 \approx f_2 \approx h_2 \approx h_3 \approx p_1 \approx p_2 \approx p_3 = 160$ (154 – 162).

Ventral region (Fig. 2). Gnathosomal region. Cheliceral setae *cha* very short, smooth; *chb* long, with minute barbs. Pedipalp five-segmented; formula of setation (trochanter to tarsus, excluding solenidion): 0-1-0-1-10; solenidion ω long. Subcapitulum with four pairs of setae, setae *a* smooth, others barbed. Epimeral region. Epimeral I with neotrichy, epimeral setal formula: 7-2-3-4; all setae similar and barbed. Genitoanal region. Genitoanal region typical for the genus. Genital setal formula: 7 + 3; antiaxial setae a little longer than paraxial setae; adanal setae longer than anal setae, all setae with cilia.

Legs. All legs monodactylous and stout. Formula of solenidia (genu to tarsus) leg I: 2-1-2; leg II: 1-1-1; leg III: 1-0-0; leg IV: 1-0-0; formula of setation (trochanter to tarsus): leg I: 0-5-2-3-14; leg II: 0-5-2-3-11; leg III: 2-4-1-3-10; leg IV: 1-4-2-2-9.

Holotype adult, Longyan (23° 23' N, 116° 82' E), Fujian Province, China, from surface soil layer under bamboo, 20 Jan. 2009, collected by HU Zhan-Yu. Paratypes: two adults, same data as holotype. All type specimens are deposited in the Institute of Entomology, Guizhou University (GUGC).

Etymology. The species name is derived from the type locality.

Remarks. Sanyal (1992) described a new species, *Millotacarus indicus* belonging to the subgenus *P.* (*M.*) (Subias 2004, 2009), therefore the notogastral setae of the species at least partly phylliform, from

which we can readily distinguished it from the new species *P.* (*P.*) *longyanensis* sp. nov. even though we can not get more information about it.

The new species is similar to *P.* (*P.*) *simplisetosus* Mahunka, 1985 by the characters of notogastral setae with minute barbs, but can be readily distinguished from the latter by the characters of the former: 1) integument with remarkable network pattern; 2) the dorsal with conspicuous irregular rough patches; 3) porose areas absent; 4) epimeral I with neotrichy, epimeral setal formula: 7-2-3-4.

Acknowledgements We would like to express our gratitude to HU Zhan-Yu (Institute of Entomology, Guizhou University, Guiyang, Guizhou Province, China) for collecting the material for this study. Our thanks are also given to XING Ji-Chun for his kind help.

REFERENCES

- Balogh, J. 1960. Oribates (Acari) nouveaux de Madagascar (1re série). *Mém. Inst. Scient. Madagascar*, 14: 7 – 37.
- Balogh, J. 1961. An outline of the family Lohmanniidae Berl., 1916 (Acari, Oribatei). *Acta Zool. Hung.*, 7: 19 – 44.
- Balogh, J. and Balogh, P. 1987. A new outline of the family Lohmanniidae Berlese, 1916 (Acari, Oribatei). *Acta Zool. Hung.*, 33 (3 – 4): 327 – 398.
- Balogh, J. and Balogh, P. 1992. The Oribatid Mites Genera of the World. Hungarian National Museum Press, Budapest.
- Chen, J., Liu, D and Wang, H-F 2010. Oribatid mites of China: a review of progress, with a checklist. *Zoosymposia*, 4: 186 – 224.
- Coetzee, L. 2001. New species of the family Lohmanniidae (Acari, Oribatida) from South Africa. *Novors. Nas. Mus. Bloemfontein.*, 17 (3): 53 – 67.
- Grandjean, F. 1950. Étude sur les Lohmanniidae (Oribates, Acariens). *Arch. Zool. Exp. Gén.*, 87: 95 – 162.
- Mahunka, S. 1985. Neue und interessante Milben aus dem Genfer Museum L.V. Oribatids from South India I (Acari; Oribatida). *Revue Suisse Zool.*, 92 (2): 367 – 383.
- Mahunka, S. 1988. New and interesting mites from the Geneva Museum LXI. Oribatids from Sabah (East Malaysia) III (Acari; Oribatida). *Revue Suisse Zool.*, 95 (3): 817 – 888.
- Mondal, B. K. and Chakrabarti, D. K. 1983. A new species and new records of soil oribatid mites (Acari; Oribatei) from forest and tea soils in Darjeeling, India. *Indian J. Acarol.*, 7: 79 – 84.
- Sanyal, A. K. 1992. Oribatida mites. 213 – 356. In: Ghosh, A. K. (ed.), Fauna of West Bengal. Part 3 (Arachnida and Acari). Zoological Survey of India, Calcutta. 1 – 500.
- Sarkar, S. and Subias, L. S. 1984. New lohmanniids (Acarina; Oribatida) from India. *Orient. Insects*, 18: 25 – 30.
- Subias, L. S. 2004. Listado sistemático, sinónimo y biogeográfico de los ácaros oribátidos (Acariformes; Oribatida) del mundo (excepto fósiles). *Graellsia*, 60 (número extraordinario): 3 – 305.
- Subias, L. S. 2009. Listado sistemático, sinónimo y biogeográfico de los ácaros oribátidos (Acariformes; Oribatida) del mundo (excepto fósiles). <http://www.ucm.es/info/zoo/Artrópodos/Catalogo.pdf>.

中国罗甲螨科一新纪录属及一新种记述 (蜱螨亚纲, 甲螨目, 罗甲螨科)

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摘 要 波利甲螨属 *Paulianacarus* 全世界过去已知 12 种, 中国无记录。记述采自福建龙岩的中国新纪录该属及 1 新种, 龙岩波利甲螨 *P. (P.) longyanensis* sp. nov.; 提议 2 新组合 *P. (M.) foliatus* Mondal et Chakrabarti, comb. nov. 和 *P. (M.) sarbias* Coetzee, comb. nov.; 编制了波利甲螨属 2 亚属 12 个种分种检索表; 详细描述了新种的形态特征并绘制了整体特征图, 比较了新种与其近似种 *P. (P.) simplisetosus* Mahunka, 1985 的区别特征。研究标本保存于贵州大学昆虫研究所。

龙岩波利甲螨, 新种 *P. (P.) longyanensis* sp. nov. (图 1 ~

关键词 罗甲螨科, 波利甲螨属, 新纪录属, 新种, 中国。
中图分类号 Q959.226

2)

浅褐色, 筒形, 体长 842 (838 ~ 846) μm , 体宽 476 (473 ~ 477) μm 。新种与 *P. (P.) simplisetosus* Mahunka 相似, 主要区别特征如下: 体表具网状结构; 背板具有一些粗糙的不规则斑状结构; 背部和腹部均无孔状结构; 第 1 基节板具增生毛, 基节板毛式为 7-2-3-4。

正模 1 头, 福建龙岩, 2009-01-20, 胡展育采。副模 2 头, 采集信息同正模。

词源: 新种种名源自采集地点龙岩。

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